

CLAIMS

1. A plug for thermoforming operations composed of a syntactic foam comprising:

5 a thermoplastic resin having a melting point and/or Tg at least 5°C higher than the design operating temperature of said thermoforming operation, and

10 a hollow filler having a lower density than said resin.

2. The plug according to claim 1, wherein said thermoplastic resin has a melting point and/or Tg of greater than 180°C.

15 3. The plug according to claim 1, wherein said thermoplastic resin has a melting point and/or Tg of greater than 200°C.

20 4. The plug according to claim 1, wherein said thermoplastic resin comprises a polyamide, polycarbonate, polyurethane, polyester, polyacrylate, and/or copolymers and/or mixtures thereof.

25 5. The plug according to claim 4, wherein said thermoplastic resin comprises a polyamide formed from a lactam monomer having at least 6 carbon atoms.

30 6. The plug according to claim 5, wherein said thermoplastic resin comprises nylon 6, nylon 6.6 or mixtures thereof.

7. The plug according to claim 1, wherein said syntactic foam comprise less than 70 vol.% of said hollow filler.

5 8. The plug according to claim 1, wherein said hollow filler includes glass microspheres, hollow polymeric microspheres, hollow ceramic microspheres, microspheres of urea-formaldehyde resin and/or phenol-formaldehyde resin.

10 9. A process for forming the plug according to claim 1, wherein said plug is formed *in-situ* from a mixture comprising said filler and a monomer which is polymerized in a mold that at least approximates the shape of the desired plug.

15 10. The process according to claim 9, wherein a lactam monomer is polymerized to polyamide.

20 11. The process according to claim 10, wherein said *in-situ* polymerization to polyamide is assisted with an alkali earth metal and/or alkaline earth metal catalyst.

25 12. The process according to claim 11, wherein said *in-situ* polymerization is assisted by an organic isocyanate, ketene, acid chloride, acid anhydride, or N-substituted imide polymerization promoter.

13. A process of thermoforming at least one article using the plug according to claims 1 or the plug prepared by the process of claims 9.
- 5    14. An article formed by the process of claim 13.

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